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STUDY OF TRIBE COULD HELP FIND EAST ASIAN SKIN COLOR GENES

HERSHEY, PA–Genetic investigation of a Malaysian tribe may tell scientists why East Asians have light skin, but lower skin cancer rates than Europeans, according to a team of international researchers. Understanding the differences could lead to a better way to protect people from skin cancer.

While the genetics of skin color is largely unknown, past research using zebrafish by Penn State College of Medicine's Keith Cheng, M.D., Ph.D., identified the gene in Europeans that differs from West Africans and contributes to a lighter skin color. Mutations in the genes SLC24A5 and SLC45A2 are largely responsible for European pigmentation, showing only single amino acid differences between Europeans and West Africans. Each version of a gene is called an allele.

While East Asians – Chinese, Japanese and Korean – also are light skinned, these European alleles are not present, suggesting that while both groups' lighter skin color evolved to allow for better creation of vitamin D in northern climates, they did so in a different way. This difference also affects skin cancer rates. Europeans have 10 to 20 times higher rates of melanoma than Africans. However, despite also having lighter skin, East Asians have the same melanoma rates as Africans. The reason for this difference can only be explained when the gene mutations for both groups are found.

"By finding the differences, we have the potential to find ways to make people with the European ancestry genes less susceptible to skin cancer," said Cheng, professor of pathology.

This is a challenge, because to find the unidentified mutations, researchers must study a population that includes a blend of original African ancestry and East Asian ancestry, with little European contribution.

The Senoi, one of three indigenous tribes from Peninsular Malaysia, meet this condition. The Senoi are believed to include ancestry of a dark-skinned tribe called the Negrito, and a regional Mongoloid population of Indo-China, such as the Proto-Malay. Since the skin color of the Senoi is darker than Northeast Asians, researchers will be able to focus on finding the primary genetic mutation of light skin color in Asians without seeing further skin lightening mutations.

Khai C. Ang, Ph.D., Postdoctoral Fellow in the Cheng lab, visited the Senoi, developed a positive relationship with them, and was able to collect 371 blood samples. Characterization of the Senoi's skin color was recently reported in PLoS ONE.

"As the world is becoming globalized, populations are becoming increasingly mixed," Ang said. "Time is running out and it will become increasingly difficult to establish how East Asian skin colors evolved."

The researchers will now map genes in the DNA using the collected samples to identify which might be responsible for the skin color of East Asians. In the Cheng lab, the candidate genes and mutations can then be tested in zebrafish for verification.

"Skin color has been tied to human welfare in modern history," Cheng said. "It is important for us as a species to realize that our skin color is determined by only a small number of minute changes in our DNA – changes that have nothing to do with the value of human beings."

Other collaborators include Badrul M. Md-Zain, School of Environmental and Natural Resource Sciences, Universiti Kebangsaan Malaysia, S. Oppenheimer, Institute of Cognitive and Evolutionary Anthropology, University of Oxford, U.K.; and Victor A. Canfield, Department of Pharmacology, Penn State College of Medicine.

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Penn State College of Medicine, located on the campus of Penn State Milton S. Hershey Medical Center in Hershey, Pa., boasts a portfolio of more than $105 million in funded research. Projects range from the development of artificial organs and advanced diagnostics to groundbreaking cancer treatments and understanding the fundamental causes of disease.

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